ATTACHMENT (2)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
National Center for Environmental Assessment
Cincinnati, OH 45268

NCEA Cincinnati Office

MEMORANDUM

DATE: October 6, 1995

SUBJECT: Review appropriateness of PRP's Preliminary Remediation Goals (Granville Solvents Site, Granville OH)

FROM: for Joan S. Dollarhide
Director
Superfund Health Risk Technical Support Center

TO: Ed Hanlon
U.S. EPA
Region 5

This memorandum is in response to your request for STSC/NCEA review of proposed Preliminary Remediation Goals for the Granville Solvents Site, Granville OH in *Design Technical Memorandum, Remediation of Impacted Soils, Granville Solvents Site, Granville Ohio*. Prepared for the Granville Solvents PRP Group, Columbus, OH, by Metcalf & Eddy, Inc., Columbus, OH, July 6, 1995 .

It does not appear that future land uses of the site were considered and PRGs calculated for these pathways. Without a discussion of future land uses, the appropriateness of the PRP's Preliminary Remediation Goals (PRGs) cannot be determined. Our review includes a number of comments regarding exposure pathways, equations used to calculate risk-based PRGs, exposure parameters, and toxicity values.

We attempted to verify the risk-based PRGs calculated by the PRP using the equations, exposure parameters, and toxicity values presented in Appendix A. With the exception of the excavation worker receptor, the PRGs we calculated differ from those calculated by the PRP. It should be noted that the risk-based PRGs were not the lowest PRGs (the soil-to-water migration PRGs were lower) and the risk based PRGs were not used as the final PRGs.

Please feel free to contact the Superfund Health Risk Technical Support Center at (513) 569-7300 if you have additional questions

Attachments

(95-029/08-23-95)

Review of Risk-Based Preliminary Remediation Goals (PRGs)
(Granville Solvents Site, Granville, Ohio)

Section 3.1: Identification of Chemicals of Concern

There was insufficient information presented in the Design Technical Memorandum to review the identification of chemicals of concern

Section 3.2: Conceptual Model

- A discussion of future land uses was not included in the Design Technical Memorandum. As discussed in RAGS HHEM part B, the most appropriate future land uses for a site should be identified. Because residential areas border the site, an assumption may be made that the site will become residential. Exposure pathways will need to be identified and PRGs calculated for future land uses of the site.

- Environmental Investigation/Excavation Workers
  - The exposure pathways identified (as presented in Figure 3-1) for on-site workers, including environmental investigation and excavation workers, include:

    Inhalation of chemical vapors emitted from site soil
    Ingestion of site soil
    Dermal contact with site soil
    Ingestion of chemicals migrating from site soil into groundwater

  - Under the NCP rule (40 CFR part 300), workers involved in the remediation of the site (including workers involved in monitoring and assessing) are covered under OSHA rather than CERCLA. Thus, it may not be necessary to derive PRGs for these workers.

- Off-site Receptors (Recreational and Residential)
  There appears to be an inconsistency between the exposure assumptions made in the text of this section and in Figure 3-1. The text states that the only feasible means for potential exposure for off-site receptors would be through contact with chemicals that migrate off the site, either emitted as vapors from site soil for recreational and residential receptors or migrating into groundwater for residential receptors. However, in Figure 3 1, ingestion and dermal contact with soil are marked as potential pathways. This inconsistency should be addressed. In addition, if the site is not heavily covered by vegetation, these are possible exposure pathways (via wind blown soil).

Section 3.3: Identification of Applicable or Relevant and Appropriate Requirements (ARARS)

■The Ohio EPA and U.S. EPA MCLs were used as ARARS for groundwater MCLs are appropriate ARARs for groundwater. The U.S. EPA MCLs were correctly reported. No attempt was made to verify the Ohio EPA MCLs.

■Bis(2-ethylhexyl)phthalate is included in Tables 3-2 (MCLs) and 3-3 (Region III and IX PRGs) but is not listed in Table 3-1 as a chemical detected in ground water, hydropunch, or soil samples.

■In Table 3-3, there appear to be some incorrect values. For bromoform, the Region III value should be 2.4 μg/L and the Region IX value should be 8.5 μg/L. For dibromochloromethane, the Region III value should be 0.13 μg/L.

■Table 3-4 cites risk-based PRGs from Region III and IX which are based on direct contact with soil. For example, the Region III PRGs for residential soil are for ingestion of soil and the Region IX PRGs for residential soil are for ingestion, inhalation, and dermal contact of soil. In addition, the residential SSLs presented in U.S. EPA (1994) were calculated for exposure to soil via ingestion and inhalation pathways. According to Section 3.2, soil ingestion and dermal contact are not exposure pathways of concern for adult and child residents (although this is identified as an exposure pathway in Figure 3-1). Thus the use of PRGs based on direct contact appears inconsistent.

■In Table 3-4, the Region IX PRG for vinyl chloride should be 5.2 μg/kg.

■Several of the PRGS cited in Table 3-4 are not actually risk-based, which should be noted in the Table. For example, the Region IX Residential Soil PRGs for ethylbenzene, m- & p- xylene, and o-xylene and the Region IX Occupational Soil PRGs for 1,1,1-trichloroethane, 1,1-dichloroethane, ethylbenzene, m- & p-xylene, o-xylene, and toluene are based on a soil saturation equation.

■Table 3-4 cites SSLs from a U.S. EPA document titled "Comparison of EPA's First 30 Draft Generic Soil Screening Levels with States' Soil Levels" (U.S. EPA, 1994). However, this document does not list SSL levels for acetone, bromodichloromethane, bromoform, carbon disulfide, chloromethane, cis-1,2-dichloroethene, and trans 1,2 dichloroethene. It appears that the SSL values for these compounds (with the exception of chloromethane) were taken from U.S. EPA (1994) "Technical Background Document for Soil Screening Guidance--Review Draft, December 1994".

■Table 3-4 lists a SSL of 7000 μg/kg for chloromethane. A SSL for chloromethane was not estimated in either U.S. EPA (1994) SSL documents (see above comment for citations).

Section 3.4: Preliminary Remediation Goals

■An overall assessment on the appropriateness of the PRGs can not be made until future land use is discussed and PRGs are calculated.

■We attempted to verify the Risk-based PRGs presented in Table 3-5 for the on-site and off-site receptors by using the equations and exposure parameters listed in Tables A7 - A18, the oral and inhalation RfDs and slope factors listed in Tables A1-A8, and volatilization factors listed in Table A19. The values that we calculated for the Environmental Sampler were the same as those listed in Table 3-5. However, the values that we calculated for the remaining receptors (Excavation Worker, Adult and Child Resident, Adult and Child Biker/Walker) differed from those listed in Table 3-5.

■Table 3-5 also presents soil PRGs based on soil to groundwater of chemicals. For the columns labeled "U.S. EPA MCL-Based" and "U.S. EPA Region IX PRG-Based", these soil concentrations were calculated using the following equations, respectively:

$$\textit{Soil level} = K_{OC} \times \textit{organic content} \times \textit{MCL}$$

$$\textit{Soil level} = K_{OC} \times \textit{organic content} \times \textit{PRG}$$

As discussed in Appendix A (pages A-2 - A-4), these equations are based on a simple predicative fate and transport model that characterizes the potential for soil to groundwater migration of chemicals. This approach for estimating soil screening levels for the migration of chemicals from soil to groundwater differs from approach outlined in U.S. EPA's (1994) soil screening guidance. U.S. EPA's (1994) equation for calculating a soil screening level (SSL) is

$$SSL = C_w \left[K_d + \frac{(\theta_w + \theta_a H')}{\rho_b} \right]$$

where C_w = nonzero MCLG, MCL, or Risk Based Level x 10
K_d = soil-water partition coefficient, K_{OC} x f_{OC}
θ_w = water filled soil porosity
θ_a = air-filled soil porosity
H' = Henry's law constant x 41
ρ_b = dry soil bulk density

The SSLs calculated using the above equation, the site-specific f_{oc} (0.01), and the default values for θ_w, θ_a, and ρ_b are higher than the soil levels presented in Table 3-5. For example, the MCL-based soil concentration for 1,1,1-trichloroethane is 2825.08 µg/kg; the MCL-based soil concentration using the equation in U.S. EPA (1994) would be 3347 µg/kg. It should be noted that U.S. EPA (1994) is draft guidance.

■MCL-based soil levels presented in Table 3-5 were calculated using MCLGs calculated by M&E for 2-butanone, acetone, and chloromethane. An attempt was made to verify these values using the equation in Table A-20, K_{OC} and OC values in Table A-19, and a relative source contribution from drinking water of 20% (used to calculate the MCLG). The calculated soil levels differed from those presented in Table 3-5.

■The soil to groundwater SSLs presented in Table 3-5 are cited to a U.S. EPA document titled "Comparison of EPA's First 30 Draft Generic Soil Screening Levels with States' Soil Levels" (U.S. EPA, 1994). This document does not list SSL levels for acetone, bromodichloromethane, bromoform, carbon disulfide, chloromethane, cis 1,2-dichloroethene, and trans-1,2-dichloroethene. It appears that the SSL values for these compounds (with the exception of chloromethane) were taken from U.S. EPA (1994) "Technical Background Document for Soil Screening Guidance--Review Draft. December 1994".

■Table 3-5 lists a SSL of 10 µg/kg for chloromethane. A SSL for chloromethane was not estimated in either of the U.S. EPA (1994) SSL documents (see above comment for citations).

■In Table 3-6, the water PRG for acetone should have a "b" superscript.

■Footnote 1 in Table 3-6 states that "the soil PRG is the lower value of the Region III and Region IX soil screening level." However, from the values in the table, it appears that the soil PRG is actually the lower value of the Region III and the *U.S. EPA* soil screening level.

■Footnote 2 in Table 3-6 should read "The groundwater PRG is the U.S. EPA maximum contaminant level (MCL). If a value is not listed, then the PRG ..."

Appendix A

■There is some inconsistency within the document for the equation to calculate the chemical specific adsorption coefficient (K_d). On page A-3, the equation is given as

$$K_d = 0.63(f_{OC} x\ K_{OW})$$

The equations in Tables A-20 and A-21 suggest that the K_d was calculated using the K_{OC} rather than the K_{OW}

$$K_d = K_{OC} x\ organic\ content\ (OC)$$

■Several Tables indicate that subchronic, rather than chronic, toxicity values were used to calculate the risk-based PRGs. In general, subchronic values are used when the exposure duration is 7 years or less and chronic values are used when the exposure duration is greater than 7 years. However, some of the Regions prefer to always use chronic values. Please consult with your Regional Toxicologists (Erin Moran, Pat VanLeeuwen, or Andrew Podowski) to determine Region 5's approach to this issue.

■Table A-1 lists subchronic toxixity values. However, for 2-butanone,Table A-1 reports a non carcinogenic *chronic* oral RfD of 6E-1 mg/kg/d found on IRIS (EPA, 1995a). There is a subchronic oral RfD for 2-butanone available in the 1995 HEAST (U.S. EPA, 1995b). Additionally, the STSC has included Risk Assessment Issue Papers addressing subchronic oral reference doses for the following contaminants:

Attachment 1:	**Risk Assessment Issue Paper for: Derivation of a Provisional Subchronic Oral RfD for Ethylbenzene (CASRN 100-41-4)**
Attachment 2:	**Risk Assessment Issue Paper for: Derivation of the Subchronic Oral Reference Dose for meta-Xylene (CASRN 108-38-3**
Attachment 3:	**Risk Assessment Issue Paper for: Evaluation of the Subchronic Oral Reference Dose for ortho-Xylene (CASRN 95-47-6)**
Attachment 4:	**Risk Assessment Issue Paper for: Derivation of the Subchronic Oral Reference Dose for para-Xylene (CARSN 106-42-3)**

■**Several Tables present** the toxicity information used to calculate risk-based PRGs. There appear to be some errors in the chronic values selected:

- RfD oral for 2-butanone should be 2E+0 mg/kg-day (source-IRIS)
- RfD inhal for 1,1,1-trichloroethane

  An RfC for 1,1,1-trichloroethane is not available on IRIS or HEAST. The Region III Risk-Based Concentration Table (February, 1995) lists a chronic RfC of 2.9 E-1 mg/kg-day (3E-1 mg/kg-day, if no significant figures are used); this is the RfC which was withdrawn from IRIS.
- RfD inhal for 1,1-dichloroethane

  An RfC of 5E+0 mg/m^3 is listed on HEAST (Table 2). Using a reference inhalation rate of 20 m^3/day and reference body weight of 70 kg, this RfC would be equivalent to 1.4E+0 mg/kg-day (1E+0 mg/kg-day, if no significant figures are used).
- RfD inhal for 2-butanone

  A subchronic RfC of 1E+0 mg/m^3 is listed on HEAST. Using a reference inhalation rate of 20 m^3/day and reference body weight of 70 kg, this RfC would be equivalent to 2.9E-1 mg/kg-day (3E-1 mg/kg-day, if no significant figures are used).
- RfD inhal for m- & p-xylene and o-xylene

  An RfC for xylenes is not available on IRIS or HEAST. The Region III Risk-Based Concentration Table (February 1995) lists a chronic RfC of 2.0E-1 mg/kg-day (2E-1 mg/kg-day, if no significant figures are used); this is the RfC which was withdrawn from IRIS.
- RfD inhal for toluene

  A chronic RfC of 4E-1 mg/m^3 is listed on IRIS. Using a reference inhalation rate of 20 m^3/day and reference body weight of 70 kg, this RfC would be equivalent to 1.1E-1 mg/kg-day (1E-1 mg/kg-day, if no significant figures are used).

■Several tables (A-1-6) contain a note that oral toxicity values were used for inhalation toxicity values in the PRG calculation when inhalation toxicity values were not available; the route-to-route extrapolated numbers should be listed on the table. An oral-to-inhalation extrapolation of risk assessment values should be done on a chemical specific-basis with toxicity and pharmacokinetic data to support the extrapolation.

■An attempt was made to verify the PRGs listed in Table A-2 using the equations in Tables A-7 and A-8, the RfDs and slope factors listed in Table A-2, and the volatilization factors in Table A-19. The calculated PRGs differed from the PRGs listed in the table.

■An attempt was made to verify the PRGs listed in Table A-3 and A-5 using the equations in Tables A-11 and A-12 and Tables A-15 and A-16, respectively. the RfDs

and slope factors listed in Table A-3 and A-5, and the volatilization factors in Table A-19. The calculated PRGs differed from the PRGs listed in the table.

■Several tables (A-4, 6, 13, 14, 17, 18) calculate separate PRGs for children in the Residential and Recreational scenario, which is not in accord with the guidance in RAGS HHEM part B. In RAGS, separate PRGs are not calculated for children, rather residential PRGs are calculated which are designed to be protective for children and adults. The remaining equations used in the Appendix are consistent with RAGS.

■An attempt was made to verify the PRGs listed in Table A-4 and A-6 using the equations in Tables A-13 and A-14 and Tables A-17 and A-18, the RfDs and slope factors listed in Table A-4 and A-6, and the volatilization factors in Table A-19. The calculated PRGs differed from the PRGs listed in the table.

■For non-carcinogenic effects, the averaging time should be equal to the exposure duration.

■As discussed in Section 3.2, the environmental sampling would not require more than one week per quarter over an indeterminate number of years. If the assumption is made that the same individuals will do the sampling each time, then a reasonable exposure frequency and duration for the Environmental Samplers would be 20 days/year and 25 years. If a 25-year exposure duration is used, then chronic oral and inhalation RfDs should be used.

■The information in Section 3.2 is inadequate to determine the exposure frequency and duration for Excavation Workers. It is noted that the excavation work would occur on an intermittent basis. The PRP's exposure frequency of 120 days/year and exposure duration of 0.33 years, suggest that the excavation work will only last for 4 months and that the workers will work every day during the period. The exposure frequency and duration for Excavation Workers needs to be re-evaluated.

REFERENCES:

U.S. EPA. 1995a. Integrated Risk Information System (IRIS).Online. Office of Health and Environmental Assessment,National Center for Environmental Assessment, Cincinnati, OH.

U. S EPA. 1995b. Health Effects Assessment Summary Tables.Annual FY-1995. Office of Research and Development, Office of Emergency and Remedial Response,Washington, DC. NTIS PB95-921199.

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